

AMENDMENT AND RESPONSE

Serial Number: 09/316,515

Filing Date: May 21, 1999

Title: METHOD AND APPARATUS FOR TREATING IRREGULAR VENTRICULAR CONTRACTIONS SUCH AS DURING ATRIAL ARRHYTHMIA

Page 2

Dkt: 279.112US1

Sub D1  
A1  
recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by an intrinsic beat; and

increasing the first indicated pacing interval, by an amount based [at least] on the most recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by a paced beat.

Sub D1  
A2  
8.[Amended] The method of claim 6, wherein [in which] computing the first indicated pacing interval ( $T_n$ ) includes [is carried] carrying out the computation according to:  $T_n = A \cdot VV_n + B \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise [is carried] carrying out the computation according to  $T_n = C \cdot VV_n + D \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $C$  and  $D$  are coefficients.

Sub D1  
A3  
15.[Amended] The method of claim 12, wherein [in which] computing the first indicated pacing interval ( $T_n$ ) includes [is carried] carrying out the computation according to:  $T_n = a \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise [is carried] carrying out the computation according to  $T_n = b \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $b$  is a coefficient.

Sub D1  
26.[Amended] The method of claim 1, in which computing the first indicated pacing interval includes limiting the [minimum] first indicated pacing interval to be longer than or equal to an interval corresponding to an upper rate limit.

A4  
27.[Amended] The method of claim 1, in which computing the first indicated pacing interval includes limiting the [maximum] first indicated pacing interval to be shorter than or equal to an interval corresponding to a lower rate limit.

Sub C2  
28.[Amended] A method, including:

detecting an atrial tachyarrhythmia;

obtaining V-V intervals between ventricular beats;

computing a first indicated pacing interval [based at least on] from a most recent V-V

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Page 3

Dkt: 279.112US1

Sub C2  
interval duration and a previous value of the first indicated pacing interval; and  
providing pacing therapy, based on the first indicated pacing interval, when the atrial tachyarrhythmia is present.

29.[Amended] The method of claim 28, in which computing the first indicated pacing interval includes:

Sub A4  
Sub D1  
adjusting the first indicated pacing interval, by an amount based [at least] on the most recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by an intrinsic beat; and

increasing the first indicated pacing interval, by an amount based [at least] on the most recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by a paced beat.

Sub A5  
35.[Amended] The method of claim 33, wherein [in which] computing the first indicated pacing interval ( $T_n$ ) includes [is carried] carrying out the computation according to:  $T_n = A \cdot VV_n + B \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise [is carried] carrying out the computation according to  $T_n = C \cdot VV_n + D \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $C$  and  $D$  are coefficients.

Sub A6  
42.[Amended] The method of claim 39, wherein [in which] computing the first indicated pacing interval ( $T_n$ ) includes [is carried] carrying out the computation according to:  $T_n = a \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise [is carried] carrying out the computation according to  $T_n = b \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $b$  is a coefficient.

Sub A7  
53.[Amended] The method of claim 28, in which computing the first indicated pacing interval includes limiting the [minimum] first indicated pacing interval to be longer than or equal to an interval corresponding to an upper rate limit.

AMENDMENT AND RESPONSE

Serial Number: 09/316,515

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Title: METHOD AND APPARATUS FOR TREATING IRREGULAR VENTRICULAR CONTRACTIONS SUCH AS DURING ATRIAL ARRHYTHMIA

Page 4

Dkt: 279.112US1

Sub D1 47  
54.[Amended] The method of claim 28, in which computing the first indicated pacing interval includes limiting the [maximum] first indicated pacing interval to be shorter than or equal to an interval corresponding to a lower rate limit.

Sub B2  
58.[Amended] A cardiac rhythm management system, including:

- a ventricular sensing circuit for sensing ventricular beats;
- a controller, obtaining V-V intervals between ventricular beats and computing a first indicated pacing interval [based at least on] <sup>from</sup> a most recent V-V interval duration and a previous value of the first indicated pacing interval; and
- a ventricular therapy circuit, providing pacing therapy based on the first indicated pacing interval.

Sub D1 48  
59.[Amended] The system of claim 58, in which the controller adjusts the first indicated pacing interval, by an amount based [at least] on the most recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by an intrinsic beat, and the controller increases the first indicated pacing interval, by an amount based [at least] on the most recent V-V interval duration and the previous value of the first indicated pacing interval, if the most recent V-V interval is concluded by a paced beat.

Sub B3 49  
63.[Amended] A cardiac rhythm management system, including:

- a ventricular sensing circuit;
- a controller, the controller including:
  - a V-V interval timer;
  - a first register, for storing a first indicated pacing interval;
  - a filter, updating the first indicated pacing interval [based on] <sup>from</sup> the V-V interval timer and the first register; and
- a ventricular therapy circuit, providing pacing therapy based at least partially on the first indicated pacing interval.

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Serial Number: 09/316,515

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Page 5

Dkt: 279.112US1

Sub D1  
67.[Amended] The system of claim 64, in which the filter includes an infinite impulse response (IIR) in updating the first indicated pacing interval based on the V-V interval timer and the first register.

68.[Amended] The system of claim 64, in which the filter includes a finite impulse response (FIR) in updating the first indicated pacing interval based on the V-V interval timer and the first register.

69.[Amended] The system of claim 64, in which the filter includes an averager in updating the first indicated pacing interval based on the V-V interval timer and the first register.

70.[Amended] The system of claim 69, in which the filter includes a weighted averager in updating the first indicated pacing interval based on the V-V interval timer and the first register.

Sub D1  
73.[Amended] The system of claim 71, wherein [in which] the filter updates the first indicated pacing interval ( $T_n$ ) according to the:  $T_n = A \cdot VV_n + B \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise the filter updates  $T_n$  [is updated] according to  $T_n = C \cdot VV_n + D \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $C$  and  $D$  are coefficients.

Sub D1  
77.[Amended] The system of claim [73] 63, in which the filter updates the first indicated pacing interval ( $T_n$ ) according to  $T_n = a \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , where  $a$  and  $w$  are coefficients,  $VV_n$  is the V-V interval duration provided by the V-V interval timer, and  $T_{n-1}$  is the previous value of the first indicated pacing interval.

Sub D1  
80.[Amended] The system of claim 77, wherein [in which] the filter updates the first indicated pacing interval ( $T_n$ ) according to the:  $T_n = a \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by an intrinsic beat, otherwise the filter updates  $T_n$  according to  $T_n = b \cdot w \cdot VV_n + (1-w) \cdot T_{n-1}$ , if  $VV_n$  is concluded by a paced beat, where  $b$  is a coefficient.